ARM AOS Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**Integrating Nephelometer**	**Humidified Integrating Nephelometer**	**Continuous Filter-based Light Absorption Photometer**	**Condensation Particle Counter**	**Optical Particle Counter**
	TSI Model 3563 Integrating Nephelometer (AOS)	TSI Model 3563 Integrating Nephelometer (AOS)	Radiance Research Model PSAP (AOS)	TSI Model 3010 Condensation Particle Counter (AOS)	Particle Measuring Systems Model PCASP-X optical particle counter (AOS)
Operator	John Ogren	John Ogren	John Ogren	John Ogren	John Ogren
Contact	John.a.ogren@noaa.gov	John.a.ogren@noaa.gov	John.a.ogren@noaa.gov	John.a.ogren@noaa.gov	John.a.ogren@noaa.gov
Quantities to be measured	Total and backwards hemispheric aerosol light scattering coefficient at 450, 550, 700 nm	Total and backwards hemispheric aerosol light scattering coefficient at 450, 550, 700 nm as a function of RH	Aerosol light absorption coefficient (565 nm)	Total particle concentration, 0.01 μm < Dp < 3 μm	Aerosol size distributions, 31 bins, 0.10 μm < Dp < 10 μm
Measurement Technique or Principle	Integrating nephelometry	Integrating nephelometry	Light attenuation through aerosol deposit on filter	Condensational particle growth and detection w/ laser optics	Particle counting and sizing
Time resolution	1 minute	1 minute	1 minute	1 minute	1 minute
Reference(s)	Sheridan et al., J. Geophys. Res., Vol. 106, 20735-20747, 2001	Sheridan et al., J. Geophys. Res., Vol. 106, 20735-20747, 2001	Sheridan et al., J. Geophys. Res., Vol. 106, 20735-20747, 2001	Sheridan et al., J. Geophys. Res., Vol. 106, 20735-20747, 2001	Sheridan et al., J. Geophys. Res., Vol. 106, 20735-20747, 2001
Flow rate	30 slpm	30 slpm	0.75 slpm	1 lpm	2 cc/sec
Pump[1]	A	A	A	A	A
Sample line[1]	A	A	A	A	A
duration	Continuous	Continuous	Continuous	Continuous	Continuous
Flow control[1]	A	A	A	A	A
Size μm	Dp < 1 μm and Dp < 10 μm alternating size cuts	Dp < 1 μm and Dp < 10 μm alternating size cuts	Dp < 1 μm and Dp < 10 μm alternating size cuts	0.01 – 3 μm	0.10-10 μm
Filter[1]	N	N	N	N	N
Power[1]	A	A	A	A	A
Data[1]	A	A	A	A	A
dimension	In AOS	In AOS	In AOS	In AOS	In AOS
Space feet	In AOS	In AOS	In AOS	In AOS	In AOS

ARM AOS Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**Ozone Monitor**	**Aerosol Filters**
	Dasibi Continuous Ozone Monitor Model 1008-RS (AOS)	NOAA/PMEL aerosol filters (permanent addition to AOS)
Operator	John Ogren	Trish Quinn
Contact	John.a.ogren@noaa.gov	Patricia.K.Quinn@noaa.gov
Quantities to be measured	Ozone mixing ratio	Aerosol ionic chemistry
Measurement Technique or Principle	UV absorption	Ion chromatography
Time resolution	1 minute	24 hours
Reference(s)	Sheridan et al., J. Geophys. Res., Vol. 106, 20735-20747, 2001	
Flow rate	2 lpm	30 lpm
Pump[1]	A	A
Sample line[1]	A	A
duration	Continuous	Continuous
Flow control[1]	A	A
Size μm	None	Dp < 1 μm
Filter[1]	N	S, changed once a week
Power[1]	A	A
Data[1]	A	A
dimension	In AOS	In AOS
Space feet	In AOS	In AOS
Desk[1]	N	N
Internet[1]	N	N
Additional Requirements	None	None

[1]S=self; A=ARM supply; N=no

ARM IOP Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**3-λ Light Absorption**	**Integrating Nephelometer**	**Integrating Nephelometer**	**Integrating Nephelometer**
	Univ. of Washington modified PSAP (Aerosol Trailer)	DRI integrating sphere nephelometer (GIF Trailer)	Radiance Research Model M-903 integrating nephelometer (GIF Trailer)	TSI Model 3563 Integrating Nephelometer
Operator	Dave Covert	Pat Arnott	Pat Arnott	John Ogren
Contact	dcovert@u.washington.edu	pat@dri.edu	pat@dri.edu	John.a.ogren@noaa.gov
Quantities to be measured	Aerosol light absorption coefficient at 3 visible wavelengths (466, 530, 660 nm)	Aerosol light scattering coefficient at 532 nm	Aerosol light scattering coefficient at 530 nm	Total and backwards hemispheric aerosol light scattering coefficient at 450, 550, 700 nm
Measurement Technique or Principle	Light attenuation through aerosol deposit on filter	Integrating nephelometry	Integrating nephelometry	Integrating nephelometry
Time resolution	1 minute	1 minute	1 minute	1 minute
Reference(s)				Anderson and Ogren, Aerosol Sci. Technol., Vol. 29, 57-69, 1998.
Flow rate	2 lpm	10 lpm	3 lpm	30 slpm
Pump[1]	A	S	S	S
Sample line[1]	A	S	S	S
duration	Continuous	Continuous	Continuous	Continuous
Flow control[1]	A	S	S	S
Size μm				Dp < 1 μm and Dp < 10 μm alternating size cuts
Filter[1]	S, changed daily	N	N	N
Power[1]	A			<100W @ 120 VAC
Data[1]	A			S
dimension	In AOS		12”x12”x24”	12”x12”x46”
Space feet	In AOS			12”x12”x46”
Desk[1]	N			N
Internet[1]	N			N
Additional	None			None; In GIF

ARM IOP Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**Photoacoustic Light Absorption**	**7-λ Aethalometer**	**Cavity Ringdown Extinction**	**TEOM**	**Dusttrak**
	DRI photoacoustic instrument (GIF)	Model XXXX Aethalometer (GIF)	DRI cavity ring-down instrument (GIF)	Tapered Element Oscillating Microbalance (GIF)	(GIF)
Operator	Pat Arnott	Pat Arnott	Pat Arnott	Pat Arnott	Pat Arnott
Contact	pat@dri.edu	pat@dri.edu	pat@dri.edu	pat@dri.edu	pat@dri.edu
Quantities to be measured	Aerosol light absorption coefficient at 532 nm	Aerosol light absorption coefficient at 7 wavelengths	Aerosol light extinction coefficient at 532 nm	Total aerosol mass concentration	
Measurement Technique or Principle	Photoacoustic light absorption	Light attenuation through aerosol deposit on filter	Extinction of light through ring-down cell	Based on oscillation frequency dependence on aerosol mass loading	
Time resolution	1 minute	2 minutes	1 minute		
Reference(s)					
Flow rate	1 lpm	1 lpm	10 lpm	3 lpm	
Pump[1]	S	S	S	S	
Sample line[1]	S	S	S	S	
duration	Continuous	Continuous	Continuous	Continuous	
Flow control[1]	S	S	S	S	
Size µm					
Filter[1]	N	N	N	N	
Power[1]					
Data[1]	S	S	S	S	
dimension					
Space feet	3’ x 3’ floor space	Can sit in rack or on desk	3’ x 5’ floor space	Can sit in rack or on desk	
Desk[1]	A	N	N	N	
Internet[1]	A	N	N	N	
Additional Requirements					

[1]S=self; A=ARM supply; N=no

ARM IOP Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**CCN Measurement**	**CCN Measurement**	**Size segregated composition**	
	DRI CCN spectrometer (GIF Trailer)	CalTech CCN instrument (GIF Trailer)	DELTA Drum sampler, eight size cuts (GIF)	
Operator	Jim Hudson	Tracey Rissman	Tom Cahill	
Contact	hudson@dri.edu	rissman@its.caltech.edu	tacahill@ucdavis.edu	
Quantities to be measured		CCN concentration at a still-to-be-determined supersaturation		
Measurement Technique or Principle		N/A		
Time resolution		~ 1 Hz		
Reference(s)		N/A		
Flow rate	12 lpm	0.8-0.9 lpm	~ 17 lpm	
Pump[1]	S	S	S	
Sample line[1]	S	S	S	
duration	Continuous	Continuous		
Flow control[1]	S	S	S	
Size µm	Dp < 2 µm	N/A		
Filter[1]	N	S		
Power[1]	40A (max) @ 120VAC	5A @ 120VAC, 2 outlets		
Data[1]	S	S	S	
dimension	3 racks of 24”x24”x40” plus a couple of pumps	15” vertical rack space, plus column that hangs on side of rack		
Space feet	8’ x 8’	6’ x 8’	2’ x 2’	
Desk[1]	A	A	N	
Internet[1]	A	A	N	
Additional Requirements		Room for a rack-mounted calibration system to be wheeled in occasionally		

[1]S=self; A=ARM supply; N=no

ACP IOP Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	PCASP	DMA	DMA / TDMA[3]
	Passive Cavity Aerosol Spectrometer Probe	Differential Mobility Analyzer (~~GIF~~)	Texas A&M high flow tandem differential mobility analyzer
Operator	Jian Wang	Jian Wang	Don Collins
Contact	jian@bnl.gov	jian@bnl.gov	dcollins@tamu.edu
Quantities to be measured	Particle size distribution		10 – 1000 nm size distribution / 10 – 700 nm hygroscopic growth
Measurement Technique or Principle			Separation based on electrical mobility
Time resolution	1 second		~ 30 minutes
Reference(s)			
Flow rate	0.06 l/min	7 l/m	1 – 3 lpm
Pump[1]	N	A[2]	S
Sample line	A	A	S
duration	Continuous	Cont	Continuous
Flow control	S	S	S
Size µm	0.12-3	0.0035-1	0.01 – 1.0
filter	N	N	N
power		5A 120v 3out	4 A @ 120 VAC 1 outlet
data	S		S
dimension		19 x 23	3' L x 2' W x 4‘ H mobile cart
Space feet		6 X 8[3]	5' x 4'
desk	N	Y	A
internet	Y	Y	A
Additional Requirements			
Location	GIF	GIF	GIF

[1]S=self; A=ARM supply; N=no

[2] Please provide: 6 LPM critical flow vacuum source

[3] ~~Please make sure that spaces assigned for Wang and Imre are contiguous.~~

[3] Not ACP

ACP IOP Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	PILS-IC	PILS-TOC	filter	TEOM
	Particle into Liquid Sampler: Ion Chromatograph ~~(GIF)~~	Particle into Liquid Sampler: Total Organic Carbon (~~GIF~~)	Quartz filter to collect 12-hr integrated sample ~~(GIF)~~	Tapered Element Oscillating Microbalance ~~(GIF)~~
Operator	Yin Nan Lee	Yin Nan Lee	Yin Nan Lee	Yin Nan Lee
Contact	ynlee@bnl.gov	ynlee@bnl.gov	ynlee@bnl.gov	ynlee@bnl.gov
Quantities to be measured	major cations and anions	total organic carbon	major cations and anions	total aerosol mass concentration
Measurement Technique or Principle	sampling using PILS followed by on-line IC analysis	sampling using PILS followed by on-line TOC analysis	filter collection followed by batch IC analysis	based on oscillation frequency dependence on aerosol mass loading
Time resolution	8 min	4 min	12 hr	30 min
Reference(s)	A particle-into-liquid collector for rapid measurement of aerosol bulk chemical composition. Weber et al. Aerosol Sci. Technol, 35, 718-727, 2001.	http://www.ionics.com/products/division/Instruments/sievers_instruments.htm#1	The BNL filter pack system for collection and determination of air pollutants, Leahy et al, BNL report - 61730, 1995.	http://www.rpco.com/products/ambprod/amb1400/index.htm
Flow rate	5 l/min	5 l/min	5 l/min	3 l/m
Pump[1]	A	A	A	A
Sample line	A	A	A	A
duration	7am-7pm	7am-7pm	7am-7pm	7am-7pm
Flow control	S	S	S	S
Size µm	PM2.5 or PM1.0	PM2.5 or PM1.0	PM2.5 or PM1.0	PM2.5 or PM1.0
filter	N	N	S	N
power	3A 120v 2out	3A 120v 2out	1A 120v 2out	1A 120v 2out
data	S	S	S	
dimension	23" w x 18" d	23" w x 18" d	18" w x 12"	18" w x 12"
Space feet	6' X 8'			
desk	Y			
internet	N			
Location	GIF	GIF	GIF	GIF

[1]S=self; A=ARM supply; N=no

ACP IOP Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**EC-OC**[6]	**SP-2**		
	Elemental and Organic Carbon (aerosol trailer)	Particle Absorption by Incandescence **TENTATIVE** ~~(GIF)~~		
Operator	Tom Kirchstetter	Darrel Baumgardner[4]		
Contact	TWKirchstetter@lbl.gov	darrel@servidor.unam.mx		
Quantities to be measured	TC/OC/BC and 330-900 nm light-transmission			
Measurement Technique or Principle	thermal analysis and light spectrometer			
Time resolution	6 hour			
Reference(s)				
Flow rate	30 std L per min	100 cc/s		
Pump[1]		S		
Sample line		A		
duration		Continuous		
Flow control	mass flow controller	S		
Size µm		0.1-10		
filter		N		
power	ARM (backup pump is 12A, 120V)	5A 120V 4 outlets		
data		S		
dimension		66 lb 30" x 30"		
Space feet		6' X 8'		
desk	need small workspace to change filters	Y		
internet	No	N		
	No PVC. Data logger to record flows, technician to log filter changes			
Location	This experiment will be housed in the Aerosol Trailer	GIF		

[1]S=self; A=ARM supply; N=no
[4] Not ACP; tentative.

~~WITHDRAWN~~ **AMS**	~~WITHDRAWN~~ **SPLAT-MS**	~~WITHDRAWN~~ **Particle collector**[5]	
~~Aerodyne Aerosol Mass Spectrometer~~	~~Single Particle Laser Ablation Time-of-flight Mass Spectrometer (GIF)~~		
~~Dan Imre~~	~~Alla Imre~~	~~Dan Imre/ Jim Cowin~~	
~~imre@bnl.gov~~	~~alla@bnl.gov~~	~~imre@bnl.gov~~	
~~2 cc/sec~~	~~3 cc/s~~		
~~s~~	~~S~~		
~~A~~	~~A~~		
~~Continuous~~	~~Continuous~~		
~~S~~	~~S~~		
~~.03 – 3~~	~~0.05-3~~		
~~N~~	~~N~~		
~~600w 120 or 240~~	~~120V, ~80A 8 outlets~~		
~~S~~	~~S~~		
~~45" X 43" X 24"~~	~~300 lb 10" x 4"~~		
~~6 X 8~~	~~10' X 20'~~[3]		
~~Y~~	~~Y~~		
~~Y~~	~~Y~~		

Other ARM Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003

Instrument	**SMART trailer (Surface Measurements for Atmospheric Radiative Transfer)**	**S^3 photometer**	**Shadowband radiometer**	**Broadband radiometers**	**Micopulse lidar**
	NASA GSFC	NASA GSFC	Yankee Environmental Systems, Inc.	Eppley, Yankee, Kipp&Zonen, NILU-UV	NASA GSFC
Operator	SMART team	Jack Ji	Jack Ji	Jack Ji	Jack Ji
Contact	Jack Ji , ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov
Quantities to be measured	Solar, terrestrial radiation	Solar radiance at 340, 380, 440, 500, 615, 675, 870, 870p1, 870p2, 936, 1030, 1240, 1640, 2130 nm	Solar irradiance at 414, 498, 614, 672, 866, 939, and 300~1000 nm (Global, Diffuse, and Direct radiance)	Solar irradiance at, 0.3~3, 0.4~3, 0.7~3 um (Global and Diffuse); 0.3~3 um (Direct); 4~50 um, also 302, 308, 315, 336, 377, 400~700 nm (Global)	Normalized Relative Backscatter
Measurement Technique or Principle	Remote sensing			Eppley PSP, PIR, NIP; Kipp and Zonen CM21, CG4, CH1	
Time resolution	Up to 1 min	15 min	1 min	1 min	1 min
Reference(s)	http://smart-commit.gsfc.nasa.gov		http://www.yesinc.com/products/data/mfr7/index.html	http://www.epplylab.com http://www.kippzonen.com/product/index.html http://alomar.rocketrange.no/nilu-uv.html	http://virl.gsfc.nasa.gov
Flow rate	No				
Pump[1]	N				
Sample line[1]	N				
Duration	Continuous				
Flow control[1]	N				
Size μm	N				
Filter[1]	N				
Power[1]	A, 100A@220V				
Data[1]	S				
Dimension	20x17x9 ft				
Space feet	25x9 ft				
Desk[1]	N				

Other ARM Measurements at SGP Central Facility during ARM ACP Aerosol IOP, May 2003
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Instrument	**Sky imager**	**Spectro-radiometer**	**Interferometer**	**Scanning microwave radiometer**	**Rain gage**
	Yankee Environmental Systems, Inc.	Analytical Spectral Devices, Inc.	ABB Bomem	NASA GSFC	Optical Scientific Inc.
Operator	Jack Ji	Jack Ji	Jack Ji	Jack Ji	Jack Ji
Contact	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov	ji@climate.gsfc.nasa.gov
Quantities to be measured	Sky image	Solar spectral irradiance 0.4~2.5 um, Sampling Interval 2nm	AERI, Sky spectral radiance 500~3000 cm-1, 1 cm-1 resolution	Sky radiance at 23, 23.8, and 36 GHz	Rain rate, measures from .1 to 500 mm/hr
Measurement Technique or Principle					
Time resolution	1 min	1 min	5 min	5 min	5 min
Reference(s)	http://www.yesinc.com/products/data/tsi440/index.html	http://www.asdi.com/asdi_t2_pr_sp_fsp.html	http://www.abb.com/global/abbzh/abbzh251.nsf!OpenDatabase&db=/global/seapr/seapr035.nsf&v=6312A&e=us&m=9F2&c=C1E6CB3C346573A385256C61005B3D44		http://www.opticalscientific.com/Org.htm
Flow rate					
Pump[1]					
Sample line[1]					
Duration					
Flow control[1]					
Size μm					
Filter[1]					
Power[1]					
Data[1]					
Dimension					
Space feet					
Desk[1]					
Internet[1]					
Additional Requirements					